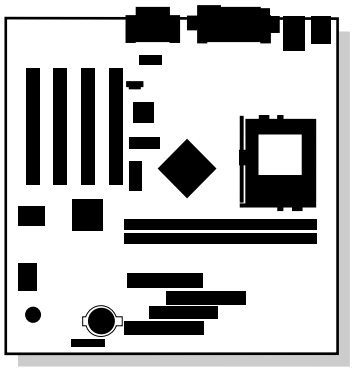
Intel® Desktop Board CA810E Product Guide



Order Number: A01813-001

Revision History

Revision	Revision History	Date
-001	Initial release	October 1999

If an FCC declaration of conformity marking is present on the board, the following statement applies:

FCC Declaration of Conformity

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions related to the EMC performance of this product, contact:

Intel Corporation
5200 N.E. Elam Young Parkway
Hillsboro, OR 97124
1-800-628-8686

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit other than the one to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Canadian Department of Communications Compliance Statement:

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numerique német pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Réglement sur le broullage radioélectrique édicté par le ministére des Communications du Canada.

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1 Desktop Board Features

Feature Summary

Form Factor	MicroATX (9.6 inches by 9.6 inches)
Processor	Support for an Intel® Pentium® III or an Intel® Celeron™ processor in a 370-pin Flip Chip Plastic Pin Grid Array (FCPGA) package or a Plastic Pin Grid Array (PPGA) package
Chipset	The Intel® 810E chipset consisting of: • Intel® 82810E DC-133 Graphics/Memory Controller Hub (GMCH DC-133) • Intel® 82801AA I/O Controller Hub (ICH) • Intel® 82802AB 4 Mbit Firmware Hub (FWH)
Memory	• Two 168-pin dual inline memory module (DIMM) sockets • Support for up to 512 MB of 100-MHz, non-ECC, unbuffered synchronous DRAM (SDRAM) — 16 MB to 256 MB using 16 MB/64 Mbit technology — 512 MB using 128 Mbit technology • Support for DIMMS with Serial Presence Detect (SPD) data structure and for non-SPD DIMMs
I/O Control	SMSC LPC47M102 super I/O controller
Peripheral Interfaces	• Two Universal Serial Bus (USB) ports • Two serial ports (header only for second serial port) • One parallel port • Support for: — Four IDE drives; support for Ultra ATA/66 transfer protocol — One diskette drive — PS/2 keyboard — PS/2 mouse
Audio	• Creative Sound Blaster† AudioPCI 128V audio controller • Crystal Semiconductor CS4297 AC '97 stereo audio codec
Video	Intel 82810E DC-133 Graphics/Memory Controller Hub with 4 MB of display cache
Expansion capabilities	Four PCI slots
Power Management	• Supports Advanced Power Management (APM) • Supports Advanced Configuration and Power Management Interface (ACPI) including Suspend to RAM (STR)
BIOS	• Intel/AMI BIOS • Intel 82802AB Firmware Hub (FWH) 4 Mbit flash memory
Other features	• Speaker • Hardware monitor (optional) • Intel® 82559 PCI LAN controller with RJ-45 LAN connector (optional)

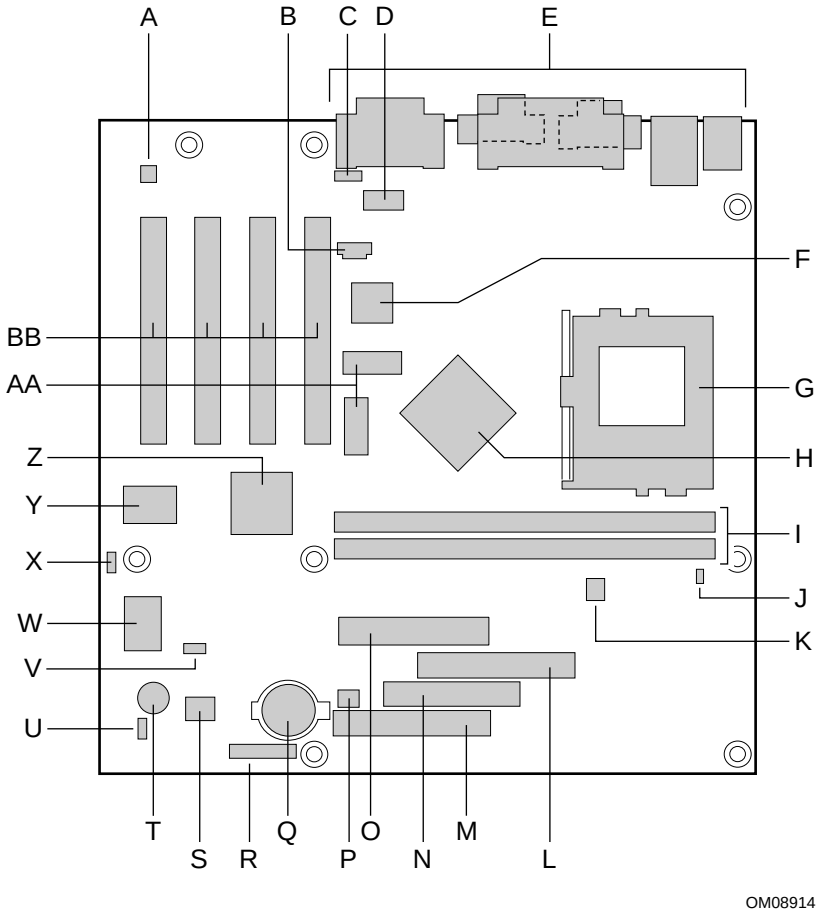
NOTE

For information about Intel® desktop boards, including technical product specifications, BIOS upgrades, and device drivers, go to the Intel World Wide Web site at:

http://support.intel.com/support/motherboards/desktop

Components

Figure 1 shows the major components on the desktop board.



A	Crystal Semiconductor CS4297 audio codec	O	Power supply connector
B	ATAPI-style CD-ROM connector	P	Chassis fan connector
C	Legacy CD-ROM connector	Q	Battery
D	Serial port B header	R	Front panel connector
E	Back panel connectors	S	Intel 82802AB Firmware Hub (FWH)
F	Intel 82559 LAN controller (optional)	T	Speaker
G	PGA370 (370-pin) processor socket	U	Alternate 1x3 front panel power LED connector
H	Intel 82810E DC-133 Graphics/Memory Controller Hub (GMCH DC-133)	V	Wake on LAN† technology connector (optional)
I	DIMM sockets	W	SMSC LPC47M102 super I/O controller
J	Hardware monitor (optional)	X	BIOS configuration jumper block
K	Processor fan connector	Y	Creative Sound Blaster AudioPCI 128V audio controller
L	Secondary IDE connector	Z	Intel 82801AA I/O Controller Hub (ICH)
M	Primary IDE connector	AA	Display cache
N	Diskette drive connector	BB	PCI slots

Figure 1. Desktop Board Components

NOTE

Components labeled optional do not come on all versions of this desktop boards.

Microprocessor

The Intel® Desktop Board CA810E supports the following 370-pin processors in a FCPGA or PPGA package.

Table 1. Processors Supported by the Desktop Board

Processor Type	Processor Frequency (in MHz)	L2 Cache Size (in KB)	Host Bus Frequency (in MHz)	Memory Frequency (in MHz)
Intel Pentium III processor	550 500	512 512	100 100	100 100
Intel Celeron processor	500 466 433 400 366	128 128 128 128 128	66 66 66 66 66	100 100 100 100 100

For the latest information on processors supported by this desktop board, refer to the CA810E link on the Intel Web site at:

http://support.intel.com/support/motherboards/desktop

For instructions on installing or upgrading the processor, see Chapter 2.

Main Memory

The desktop board has two sockets for installing DIMMs. Minimum memory size is 32 MB; maximum memory size is 512 MB. Since some of the system memory is dedicated to video, install at least 64 MB of memory for optimal video performance or if using the Windows NT† 4.0 operating system. All supported onboard memory is cacheable. See Chapter 2 for types of memory supported and installation instructions.

Intel® 810E Chipset

The Intel 810E chipset consists of the following devices:

- Intel 82810E DC-133 Graphics/Memory Controller Hub (GMCH DC-133)
- Intel 82801AA I/O Controller Hub (ICH)
- Intel 82802AB Firmware Hub (FWH)

Intel® 82810E DC-133 Graphics/Memory Controller Hub (GMCH DC-133)

The GMCH DC-133 has these features:

- Integrated graphics controller
  - 3-D Hyper Pipelined architecture
  - Full 2-D hardware acceleration
  - Motion video acceleration
- 3-D graphics visual and texturing enhancements
- Support for 4 MB of 133-MHz SDRAM display cache
- Integrated 24-bit 230 MHz RAMDAC
- DDC2B compliance
- Hardware motion compensation for software MPEG2 decode
- Integrated graphics memory controller

Visit Intel's World Wide Web site for information about graphics drivers:
http://support.intel.com/support/motherboards/desktop/

Table 2 lists the refresh rates supported by the desktop board.

Table 2. Intel 82810E DC-133 GMCH Refresh Rates

Resolution	Colors	60 Hz	70 Hz	72 Hz	75 Hz	85 Hz
640x480	16	x	x	x	x	x
	256	x	x	x	x	x
	64 K	x	x	x	x	x
	16 M	x	x	x	x	x
720x480	256				x	x
	64 K				x	x
	16 M				x	x
720x576	256	x			x	x
	64 K	x			x	x
	16 M	x			x	x
800x600	256	x	x	x	x	x
	64 K	x	x	x	x	x
	16 M	x	x	x	x	x
1024x768	256	x	x	x	x	x
	64 K	x	x	x	x	x
	16 M	x	x	x	x	x
1152x864	256	x	x	x	x	x
	64 K	x	x	x	x	x
	16 M	x	x	x	x	x
1280x1024	256	x	x	x	x	x
	64 K	x	x	x	x	x
	16 M	x	x		x	x
1600x1200	256	x	x	x	x	x

Intel® 82801AA I/O Controller Hub (ICH)

The ICH has these features:

- Support for the PCI bus
- Support for the Low Pin Count (LPC) interface
- Integrated IDE controller
- Support for USB
- General purpose I/O
- Power management logic
- Support for the System Management Bus
- Real-Time Clock

Intel® 82802AB Firmware Hub (FWH)

The FWH has these features:

- System BIOS
- Nonvolatile memory core based on Intel® flash technology
- System security and manageability logic that enables protection for storing and updating of platform information
- Random Number Generator (RNG) for use in security applications

Audio Subsystem

The audio subsystem consists of these devices:

- Creative Sound Blaster AudioPCI 128V digital controller
- Crystal Semiconductor CS4297 AC ’97 stereo audio codec
- Back panel and onboard audio connectors

Creative Sound Blaster AudioPCI 128V Audio Controller

The Creative Sound Blaster AudioPCI 128V audio controller interfaces to the PCI bus as a Plug and Play device and has these features:

- 100% DOS legacy compatible
- Access to main memory through the PCI bus for wavetable synthesis support – does not require a separate wavetable ROM device
- PC 98 and PC 99 compliance

Crystal Semiconductor CS4297 Stereo Audio Codec

The Crystal Semiconductor CS4297 stereo audio codec features:

- High performance 18-bit stereo full-duplex audio codec with up to 48 KHz sampling rate
- Connects to the Sound Blaster AudioPCI 128V using a digital interface

Audio Connectors

The audio connectors include the following:

- ATAPI-style CD-ROM connector
- Legacy-style 2 mm CD-ROM connector
- Back panel connectors
  - Line out
  - Line in
  - Mic in
  - MIDI/Game port

NOTE

The line out connector located on the back panel is designed to power headphones or amplified speakers only. Poor audio quality may occur if passive (non-amplified) speakers are connected to this output.

Audio Drivers and Utilities

Audio drivers and utilities are available from Intel's World Wide Web site at:

http://support.intel.com/support/motherboards/desktop

Speaker

A 47 Ω inductive speaker is mounted on the desktop board. The speaker provides audible error code (beep code) information during the Power-On Self-Test (POST).

LAN Subsystem (Optional)

The Intel 82559 Fast Ethernet Wired for Management (WfM) PCI LAN subsystem provides both 10Base-T and 100Base-TX connectivity. Features include:

- 32-bit, 33-MHz direct bus mastering on the PCI bus
- Shared memory structure in the host memory that copies data directly to/from host memory
- 10Base-T and 100Base-TX capability using a single RJ-45 connector with connection and activity status LEDs
- IEEE 802.3u Auto-Negotiation for the fastest available connection
- Jumperless configuration; the LAN subsystem is completely software configurable

Intel® 82559 LAN Controller

The 82559 PCI LAN controller features include:

- CSMA/CD Protocol Engine
- PCI bus interface
- DMA engine for movement of commands, status, and network data across the PCI bus
- Integrated physical layer interface, including:
  - Jumperless configuration; the LAN subsystem is completely software configurable
  - Complete functionality necessary for the 10Base-T and 100Base-TX network interfaces; when in 10 Mbit/sec mode, the interface drives the cable directly
  - A complete set of Media Independent Interface (MII) management registers for control and status reporting
  - 802.3u Auto-Negotiation for automatically establishing the best operating mode when connected to other 10Base-T or 100Base-TX devices, whether half- or full-duplex capable

- Integrated power management features, including:
  - Support for APM
  - Support for Wake on LAN technology
  - Support for ACPI S3 state

LAN Subsystem Software

The Intel 82559 Fast Ethernet WfM PCI LAN software and drivers are available from Intel's World Wide Web site at:

http://support.intel.com/support/motherboards/desktop

RJ-45 LAN Connector LEDs

Two LEDs are built into the RJ-45 LAN connector. Table 3 describes the LED states when the board is powered up and the LAN subsystem is operating.

Table 3. RJ-45 LAN Connector LEDs

LED Color	LED State	Indicates
Green	Off	10 Mbit/sec speed is selected.
	On	100 Mbit/sec speed is selected.
Yellow	Off	LAN link is not established.
	On (steady state)	LAN link is established.
	On (brighter and pulsing)	The computer is communicating with another computer on the LAN.

PCI Enhanced IDE Interface

The PCI enhanced IDE interface handles the exchange of information between the processor and peripheral devices like hard disks, CD-ROM drives, and Iomega† Zip† drives inside the computer. The interface supports:

- Up to four IDE devices (such as hard drives)
- ATAPI devices (such as CD-ROM drives)
- PIO Mode 3 and PIO Mode 4 devices
- Ultra ATA/33 and Ultra ATA/66
- Logical block addressing (LBA) of hard drives larger than 528 MB and extended cylinder head sector (ECHS) translation modes
- Support for laser servo (LS-120) drives

Input/Output (I/O) Controller

The SMSC LPC47M102 super I/O controller handles the exchange of information between the processor and external devices, such as a mouse, keyboard, or printer that are connected to the computer. The controller features:

- Low pin count (LPC) interface
- Two serial ports
- Infrared port (IrDA† 1.0 compliant)
- One parallel port with Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP) support
- PS/2–style mouse and keyboard interfaces
- Interface for one 1.2 MB, 1.44 MB, or 2.88 MB diskette drive
- Intelligent power management, including a programmable wake-up event interface
- Dual game port interface
- MPU-401 MIDI support
- Fan control:
  - — Two fan speed control outputs
  - — Two fan tachometer inputs

The BIOS Setup program provides configuration options for the I/O controller.

Real-Time Clock

The desktop board has a time-of-day clock and 100-year calendar that will roll over to 2000 at the turn of the century. A battery on the desktop board keeps the clock current when the computer is turned off.

NOTE

The recommended method of accessing the date in systems with Intel desktop boards is indirectly from the Real-Time Clock (RTC) via the BIOS. The BIOS on Intel desktop boards and baseboards contains a century checking and maintenance feature that checks the least two significant digits of the year stored in the RTC during each BIOS request (INT 1Ah) to read the date and, if less than 80 (i.e., 1980 is the first year supported by the PC), updates the century byte to 20. This feature enables operating systems and applications using the BIOS date/time services to reliably manipulate the year as a four-digit value.

For more information on proper date access in systems with Intel desktop boards, see the Intel Web site at:

http://support.intel.com/support/year2000/index.htm

USB Support

The desktop board has two USB ports. You can connect two USB peripheral devices directly to the computer without an external hub. To attach more than two devices, connect an external hub to either of the built-in ports. The desktop board supports the standard universal host controller interface (UHCI) and uses standard software drivers written to be compatible with UHCI.

NOTE

Computer systems that have an unshielded cable attached to a USB port may not meet FCC Class B requirements, even if no device or a low-speed USB device is attached to the cable. Use a shielded cable that meets the requirements for a full-speed USB device.

Expansion Slots

The desktop board has four PCI expansion slots.

Battery

A battery on the desktop board keeps the clock and the values in CMOS RAM current when your computer is turned off. See Chapter 2 for instructions on how to replace the battery.

BIOS

The BIOS includes the POST, the BIOS Setup program, the PCI and IDE auto-configuration utilities, and the video BIOS.

To upgrade the BIOS, see Chapter 3.

PCI Auto Configuration

If you install a PCI add-in board in your computer, the PCI auto-configuration utility in the BIOS automatically detects and configures the resources (IRQs, DMA channels, and I/O space) for that add-in board. You do not need to run the BIOS Setup program after you install a PCI add-in board.

IDE Auto Configuration

If you install an IDE device (such as a hard drive) in your computer, the IDE auto-configuration utility in the BIOS automatically detects and configures the device for your computer. You do not need to run the BIOS Setup program after installing an IDE device.

Security Passwords

The BIOS includes security features that restrict whether the BIOS Setup program can be accessed and who can boot the computer. A supervisor password and a user password can be set for the Setup and for booting the computer, with the following restrictions:

- The supervisor password gives unrestricted access to view and change all Setup options. If only the supervisor password is set, pressing <Enter> at the password prompt of Setup gives the user restricted access to Setup.
- If both the supervisor and user passwords are set, you must enter either the supervisor password or the user password to access Setup. Setup options are then available for viewing and changing depending on whether the supervisor or user password was entered.
- Setting a user password restricts who can boot the computer. The password prompt is displayed before the computer is booted. If only the supervisor password is set, the computer boots without asking for a password. If both passwords are set, you can enter either password to boot the computer.

Power Management Features

Power management is implemented at several levels, including:

- Software support:
  - Advanced Power Management (APM)
  - Advanced Configuration and Power Interface (ACPI)
- Hardware support:
  - Wake on LAN technology
  - Instantly Available technology
  - Resume on Ring

If the board is used with an ACPI-aware operating system, the BIOS can provide ACPI support. Otherwise, it defaults to APM support.

Wake on LAN Technology

The optional Wake on LAN technology connector can be used with PCI bus network adapters that have a remote wake-up connector. Network adapters that are PCI 2.2 compliant assert the wake-up signal through the PCI bus signal PME# (pin A19 on the PCI bus connectors). The optional onboard LAN subsystem also supports remote wake up using the PME# signal.

⚠ CAUTION

For Wake on LAN technology, the 5 V standby line for the power supply must be capable of delivering at least 720 mA of current. Failure to provide adequate standby current when implementing Wake on LAN technology can damage the power supply.

Instantly Available Technology

Instantly Available technology enables the board to enter the ACPI S3 (Suspend to RAM) sleep state. While in the S3 sleep state, the computer will appear to be off. When signaled by a wake-up device or event, the system quickly returns to its last known wake state.

The standby power indicator (located between the DIMM sockets and the power connector) provides an indication that power is still present to the DIMMs and PCI bus connectors, even when the computer appears to be off. Figure 2 shows the location of the standby power LED.

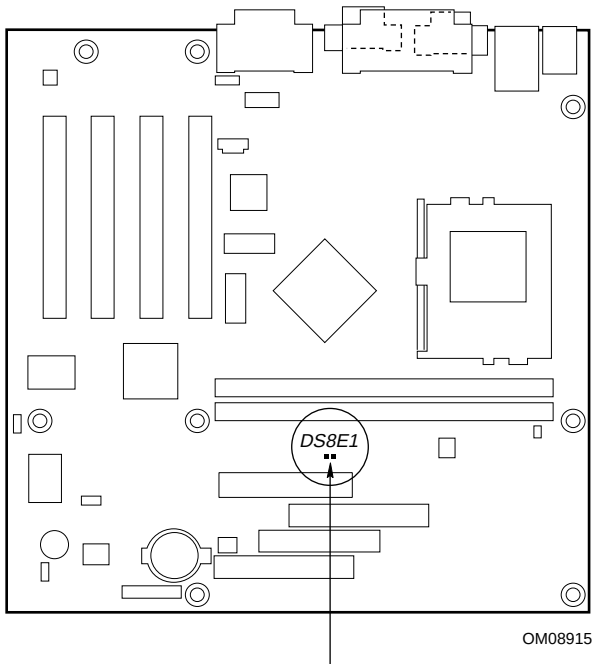


Figure 2. Location of the Standby Power Indicator LED

CAUTION

For Instantly Available technology, the 5 V standby line for the power supply must be capable of delivering at least 720 mA of current. Failure to provide adequate standby current when using this feature can damage the power supply.

Resume on Ring

The operation of Resume on Ring can be summarized as follows:

- Resumes operation from either the APM sleep mode or the ACPI S1 state
- Requires only one call to access the computer
- Detects incoming call similarly for external and internal modems; does not use the Wake on Ring connector
- Requires modem interrupt be unmasked for correct operation

2 Installing and Replacing Desktop Board Components

This chapter tells you how to:

- Install and remove the desktop board
- Install an additional support standoff for the desktop board
- Install and remove the processor
- Install and remove memory
- Replace the battery
- Connect the IDE drives
- Clear the passwords
- Set the BIOS Setup configuration jumper

Before You Begin

⚠ CAUTIONS

Before you install this desktop board in a chassis, see Appendix B for regulatory requirements and precautions.

- Always follow the steps in each procedure in the correct order.
- Set up a log to record information about your computer, such as model, serial numbers, installed options, and configuration information.
- Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation using an antistatic wrist strap and a conductive foam pad. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the computer chassis.

⚠ WARNINGS

The procedures in this chapter assume familiarity with the general terminology associated with personal computers and with the safety practices and regulatory compliance required for using and modifying electronic equipment.

Disconnect the computer from its power source and from any telecommunications links, networks, or modems before performing any of the procedures described in this chapter. Failure to disconnect power, telecommunications links, networks, or modems before you open the computer or perform any procedures can result in personal injury or equipment damage. Some circuitry on the desktop board can continue to operate even though the front panel power button is off.

How to Install and Remove the Desktop Board

Refer to your chassis manual for instructions on installing and removing the desktop board. On a microATX chassis, the desktop board is secured to the chassis by eight screws. Figure 3 shows the locations of the mounting screw holes. On a standard ATX chassis, the desktop board is secured to the chassis by seven screws and the provided standoff (see Figure 4).

NOTES

You will need a Philips (#2 bit) screwdriver.

Refer to Appendix B for regulatory requirements and installation instructions and precautions.

WARNING

This procedure should be done only by qualified technical personnel. Disconnect the computer from its power source before doing the procedures described here. Failure to disconnect the power before you open the computer can result in personal injury or equipment damage.

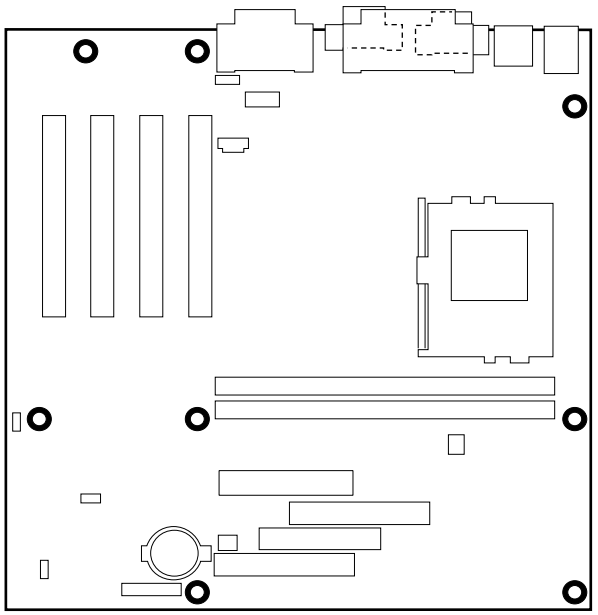
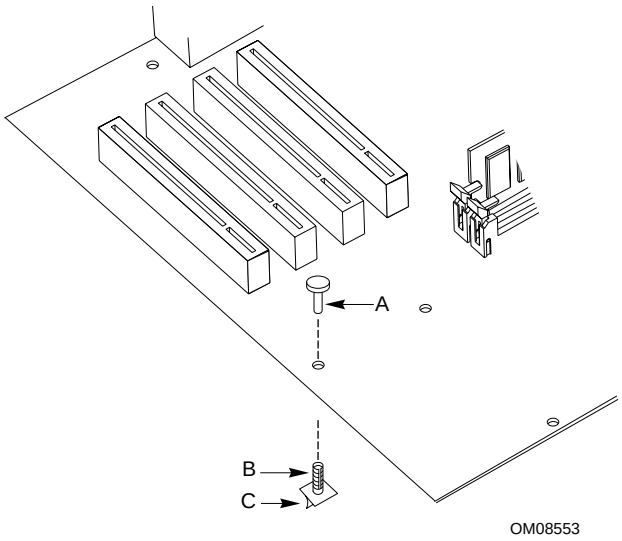


Figure 3. Locations of the Mounting Screw Holes

How to Install a Desktop Board Support Standoff

The desktop board fits in a microATX chassis, but it can also be installed in a standard ATX chassis. When it is installed in a standard ATX chassis, one of the desktop board support positions might not have a corresponding standoff in the chassis. The following steps describe how to install an additional standoff in a standard ATX chassis and how to secure the desktop board to this added standoff. Figure 4 shows the standoff (B), its associated adhesive pad (C), and a standoff retention pin (A).



A	Standoff retention pin
B	Standoff
C	Adhesive pad

Figure 4. Installing an Additional Desktop Board Support Standoff

Perform the following steps to install the added standoff for the desktop board:

1. Trial fit the added standoff (B) in the desktop board (in the position indicated in Figure 4), then position the desktop board in the ATX chassis on the existing standoffs, noting the required mounting location for the new standoff in the chassis.
2. Remove the desktop board, clean the mounting location, then remove the protective paper covering the adhesive (C) at the base of the added standoff (B).
3. Remount the desktop board in the chassis and press down on the added standoff (B) until the adhesive secures it to the chassis.
4. When final fitting the desktop board into the chassis, position the desktop board at the same height on the added standoff (B) as the other standoffs. Press the standoff retention pin (A) into the added standoff to lock the desktop board at that height.

How to Install the Processor

To install a processor, follow these instructions:

1. Observe the precautions in “Before You Begin” (see page 21).
2. Locate the processor socket and raise the socket handle completely (see Figure 5).

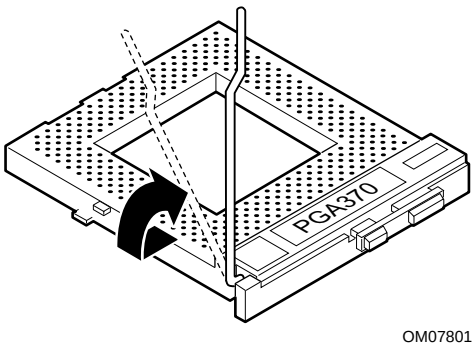


Figure 5. Raising the Socket Handle

3. Aligning the pins of the processor with the socket, insert the processor into the socket (see Figure 6).

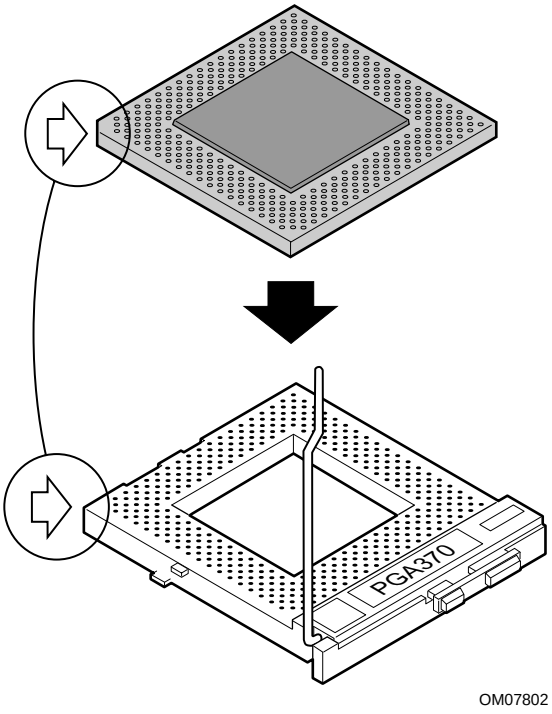


Figure 6. Inserting the Processor into the Socket

4. Close the handle completely (see Figure 7).

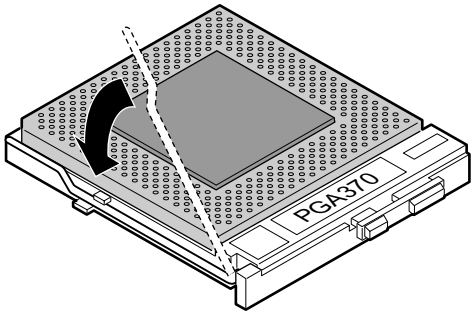


Figure 7. Closing the Handle

5. Place the fan heatsink on top of the processor (see Figure 8).

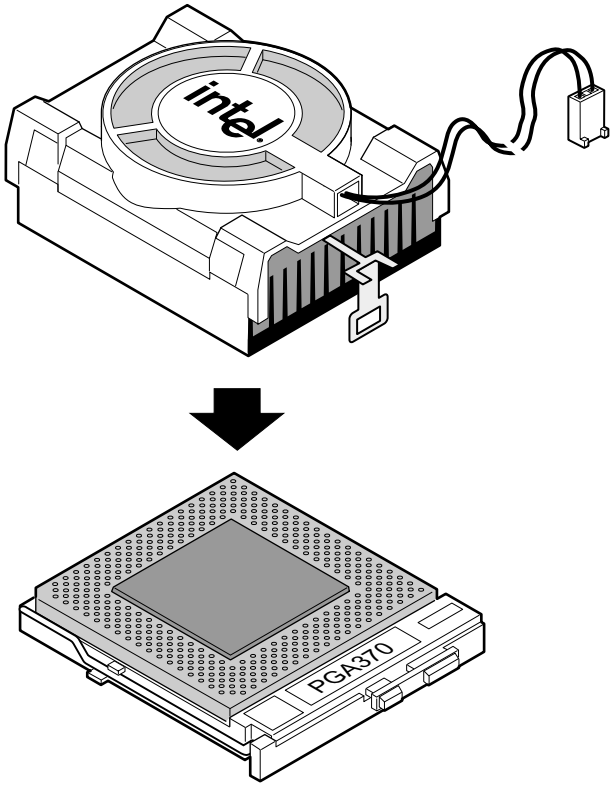
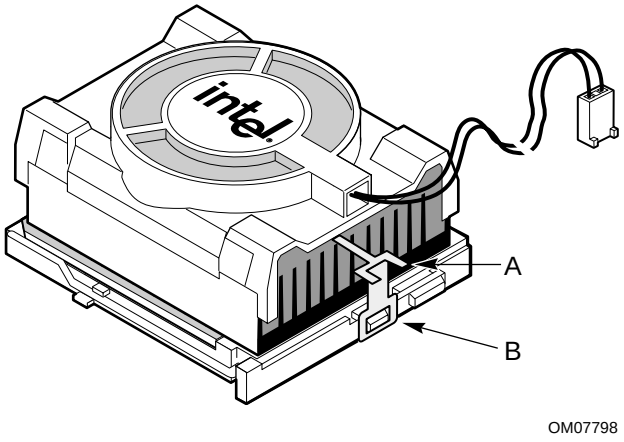


Figure 8. Attaching the Heatsink to the Processor

6. Attach the fan heatsink clips to the processor socket (see Figure 9).



A	Fan Heatsink Clip
B	Processor Socket

Figure 9. Attaching the Fan Heatsink Clip

7. Connect the processor fan cable to the processor fan connector (see Figure 10).

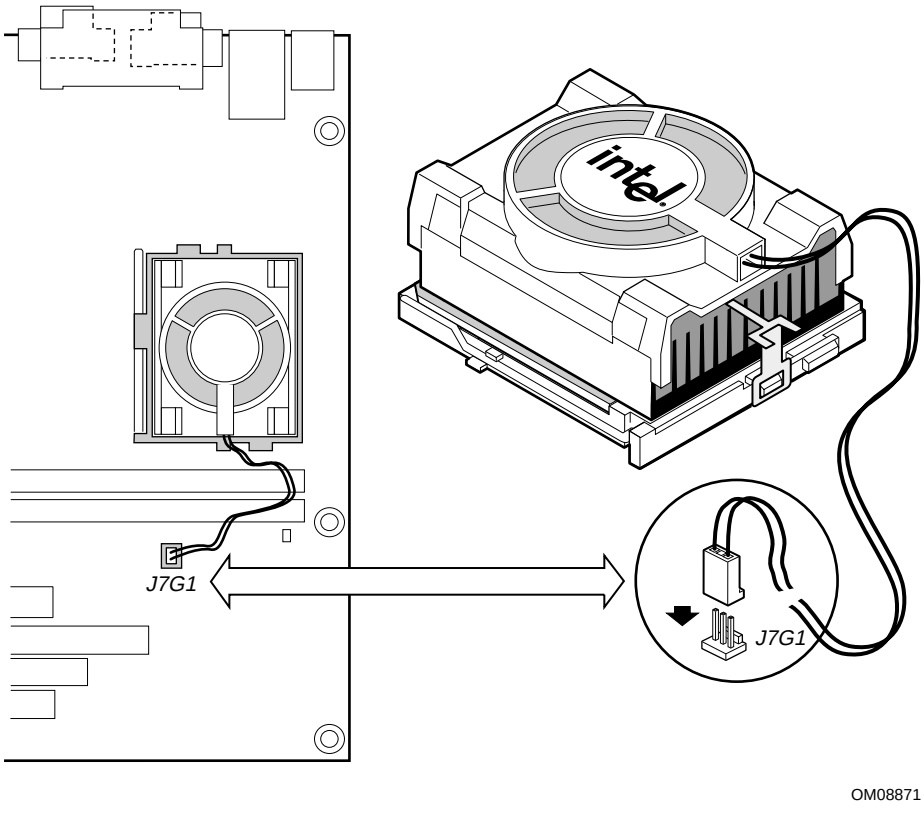


Figure 10. Connecting the Processor Fan Cable to the Processor Fan Connector

How to Remove the Processor

To remove the processor, follow these instructions:

1. Observe the precautions in "Before You Begin" (see page 21).
2. Disconnect the processor fan cable.
3. Detach the fan heatsink clips.
4. Raise the socket handle completely.
5. Remove the processor.

How to Install Memory

You can install from 32 MB to 512 MB of memory in the DIMM sockets. The board has two DIMM sockets arranged as banks 0 and 1. As shown in Figure 11 on page 28, the DIMM socket closest to the processor is for bank 0.

The desktop board supports the following memory features:

- 168-pin, 3.3 V DIMMs with gold-plated contacts
- 100 MHz, 4-clock, unbuffered SDRAM DIMMs
- Non-ECC (64-bit) memory
- A minimum of 32 MB of memory; a maximum of 512 MB of memory

For optimal video performance, install at least 64 MB of memory.

- Module sizes: 16 MB, 32 MB, 64 MB, 128 MB, and 256 MB
- DIMMs with Serial Presence Detect (SPD) data structure or non-SPD DIMMs

⚠ CAUTION

*It is **highly** recommended that SPD DIMMs be use. This allows the BIOS to read the SPD data and program the chipset to accurately configure memory settings for optimum performance. If non-SPD memory is installed, the BIOS will attempt to correctly configure the memory settings, but performance and reliability may be impacted.*

NOTE

Since some of the system memory is dedicated to video, install at least 64 MB of memory for optimal video performance or if using the Windows NT† 4.0 operating system.

The desktop board supports single- or double-sided DIMMs in the following sizes:

DIMM Size	Non-ECC Configuration
16 MB	2 Mbit x 64
32 MB	4 Mbit x 64
64 MB	8 Mbit x 64
128 MB	16 Mbit x 64
256 MB	32 Mbit x 64

When adding memory, be aware that:

- You can install DIMMs in either of the two banks. That is, if only one DIMM is being installed, it can be placed in either DIMM socket.
- You can use different sizes of DIMMs in different banks.
- The BIOS detects the size and type of installed memory.

Figure 11 shows the location of the DIMM sockets.

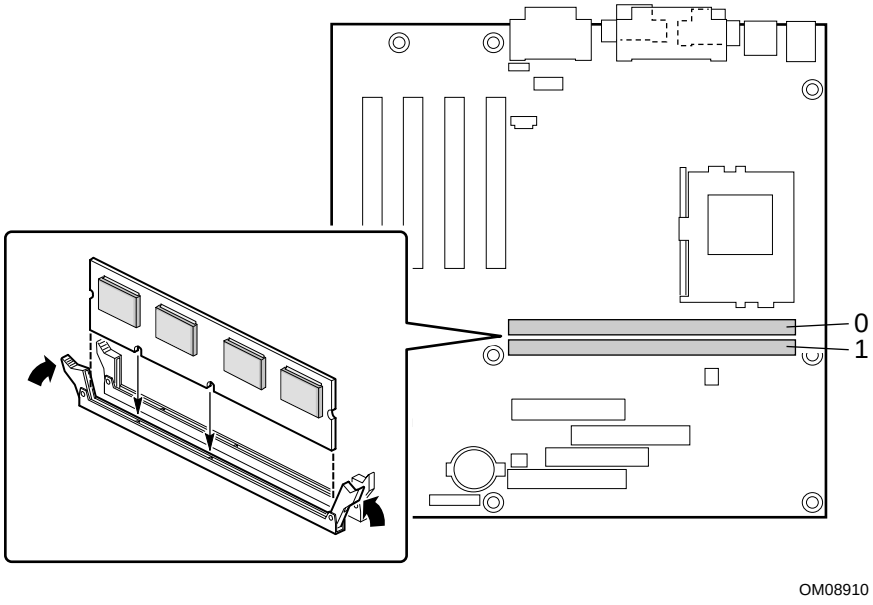


Figure 11. Installing a DIMM

To install DIMMs, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 21).
2. Turn off all peripheral devices connected to the computer. Turn off the computer. Unplug the computer.
3. Remove the computer cover and locate the empty DIMM sockets.
4. Holding the DIMM by the edges, remove it from its antistatic package.
5. Make sure the clips at either end of the socket are pushed away from the socket.
6. Position the DIMM above the socket. Align the two small notches in the bottom edge of the DIMM with the keys in the socket.
7. Insert the bottom edge of the DIMM into the socket (as shown in Figure 11).
8. When the DIMM is seated, push down on the top edge of the DIMM until the retaining clips snap into place. Make sure the clips are firmly in place.
9. Replace the computer cover.

How to Remove Memory

To remove a DIMM, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 21).
2. Turn off all peripheral devices connected to the computer. Turn off the computer. Unplug the computer.
3. Remove the computer cover.
4. Gently spread the retaining clips at each end of the socket. The DIMM pops out of the socket.
5. Hold the DIMM by the edges, lift it away from the socket, and store it in an antistatic package.
6. Reinstall and reconnect any parts you removed or disconnected to reach the DIMM sockets.

How to Replace the Battery

When your computer is turned off, a lithium battery maintains the current time-of-day clock and the values in CMOS RAM current. Figure 12 on page 30 shows the location of the battery.

The battery should last from three to five years. When the battery begins to die, it loses voltage; when the voltage drops below a certain level, the BIOS Setup program settings stored in CMOS RAM (for example, the date and time) might not be accurate. Replace the battery with an equivalent one.

WARNING

Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.

ATTENTION

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du méme type ou d'un type recommandé par le constructeur. Mettre au rébut les batteries usagées conformément aux instructions du fabricant.

ADVARSEL!

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

ADVARSEL

Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

VARNING

Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

VAROITUS

Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käjtetty paristo valmistajan ohjeiden mukaisesti.

To replace the battery, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 21).
2. Turn off all peripheral devices connected to the computer. Turn off the computer. Unplug the computer.
3. Remove the computer cover.
4. Locate the battery on the desktop board (see Figure 12).
5. With a medium flat-bladed screwdriver, gently pry the battery free from its socket. Note the orientation of the "+" and "-" on the battery.
6. Install the new battery in the socket, orienting the "+" and "-" correctly.
7. Replace the computer cover.

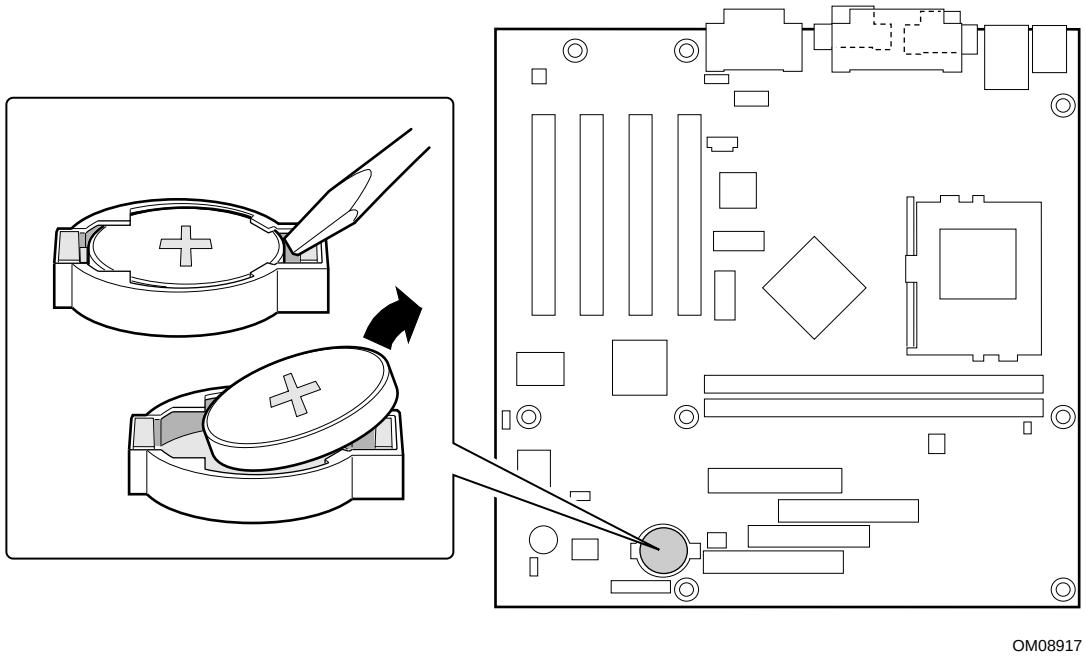


Figure 12. Removing the Battery

NOTE

If your local ordinances permit, you may dispose of individual batteries as normal trash. Do not expose batteries to excessive heat or fire. Keep all batteries away from children.

How to Connect IDE Drives

The Intel boxed desktop board package includes two IDE cables. The 40-contact, 40-conductor cable supports the Ultra ATA/33 transfer protocol. The 40-contact, 80-conductor cable supports the Ultra ATA/66 transfer protocol and is backward compatible with drives using slower IDE transfer protocols. The Ultra ATA/66 cable can be identified by its blue, gray, and black connectors. Each cable is capable of connecting two drives to the desktop board.

Figure 13 shows how a cable is connected. Follow these steps to connect each cable:

1. Attach the cable end with the single connector (A) to the desktop board.
2. Attach the cable end with the two closely spaced connectors(B) to the drives.

NOTE

To ensure that drives capable of operating in bus mastering mode are not forced into PIO mode operation, PIO mode drives should not be installed on the same cable as bus mastering drives.

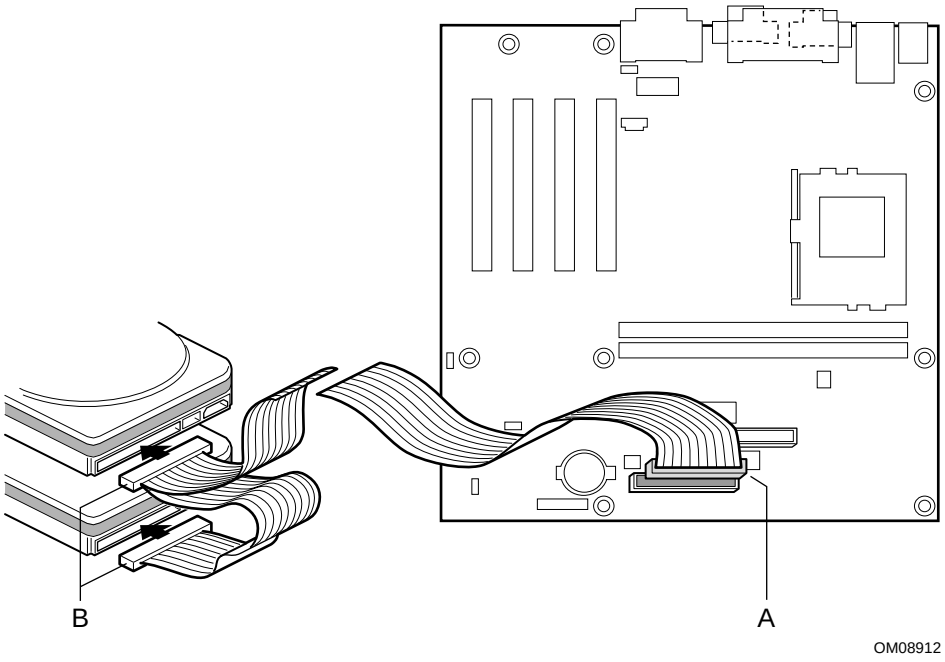


Figure 13. Connecting the IDE Cable

How to Clear the Passwords

This procedure assumes that the desktop board is installed in the computer and the configuration jumper block is set to normal mode.

1. Observe the precautions in "Before You Begin" (see page 21).
2. Turn off all peripheral devices connected to the computer. Turn off the computer. Unplug the computer.
3. Remove the computer cover.
4. Find the configuration jumper block (see Figure 14).
5. Place the jumper on pins 2-3 as shown below.

6. Replace the cover, plug in the computer, turn on the computer, and allow it to boot.
7. The computer starts the Setup program. Setup displays the Maintenance menu.
8. Use the arrow keys to select Clear Passwords. Press <Enter> and Setup displays a pop-up screen requesting that you confirm clearing the password. Select Yes and press <Enter>. Setup displays the Maintenance Menu again.
9. Press <F10> to save the current values and exit Setup.
10. Turn off the computer. Unplug the computer.
11. Remove the computer cover.
12. To restore normal operation, place the jumper on pins 1-2 as shown below.

13. Replace the cover, plug in the computer, and turn on the computer.

How to Set the BIOS Setup Configuration Jumper

This three-pin jumper block, shown in Figure 14, enables all desktop board configuration to be done in BIOS Setup. Table 4 shows the jumper settings for the Setup program modes.

⚠ CAUTION

Always turn off the computer and unplug the power cord from the computer before changing the jumper. Moving the jumper with the power on may result in unreliable computer operation.

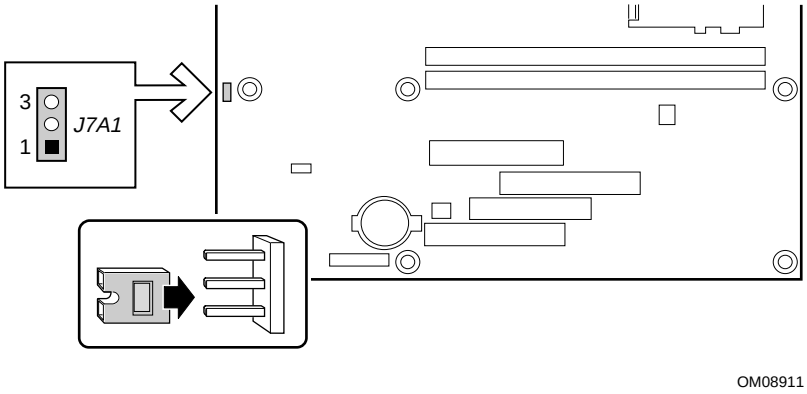


Figure 14. Location of the Jumper Block

Table 4. Jumper Settings for BIOS Setup Program Modes

Function / Mode	Jumper Setting	Configuration
Normal	1-2	The BIOS uses current configuration information and passwords for booting.
Configure	2-3	After the Power-On Self-Test (POST) runs, the BIOS displays the Maintenance Menu. Use this menu to clear passwords, to clear Wired for Management Boot Integrity Service (BIS) credentials, and to change extended configuration memory settings.
Recovery	none	The BIOS attempts to recover the BIOS configuration. A recovery diskette is required.

3 Upgrading the BIOS

This chapter tells you how to:

- Upgrade the BIOS using the Intel® Flash Memory Update Utility
- Recover the BIOS if an upgrade fails

Preparing for the Upgrade

Before you upgrade the BIOS, prepare by:

- Obtaining the BIOS upgrade file
- Recording the current BIOS settings
- Creating a bootable diskette
- Creating the BIOS upgrade diskette

Obtain the BIOS Upgrade File

You can upgrade to a new version of the BIOS by using the BIOS upgrade file. The BIOS upgrade file is a compressed self-extracting archive that contains all the files you need to upgrade the BIOS. The BIOS upgrade file contains:

- New BIOS files
- BIOS recovery files
- Intel Flash Memory Update Utility

You can obtain the BIOS upgrade file through your computer supplier or from the Intel World Wide Web site:

http://support.intel.com/support/motherboards/desktop/

NOTE

Please review the instructions distributed with the update utility before attempting a BIOS upgrade.

The Intel Flash Memory Update Utility allows you to:

- Upgrade the BIOS in flash memory
- Update the language section of the BIOS

Record the Current BIOS Settings

1. Boot the computer and press <F2> when you see the message:

   ```
   Press <F2> Key if you want to run SETUP
   ```

NOTE

Do not skip step 2. You will need these settings to configure your computer at the end of the upgrade procedure.

2. Write down the current settings in the BIOS Setup program.

Create a Bootable Diskette

NOTE

If your drive A is an LS-120 diskette drive, you must use a 1.44-MB diskette as the bootable BIOS upgrade diskette. The computer is unable to recover a BIOS from an LS-120 diskette.

To create a bootable diskette using a DOS system:

- Place an unformatted diskette in the diskette drive and format the diskette using the /s option. *Example:* `format a: /s`
- Alternatively, place a formatted diskette in the diskette drive and use the sys command. *Example:* `sys a:`

To create a bootable diskette using a non-DOS system:

1. Obtain the BIOS upgrade file through your computer supplier or from the Intel World Wide Web site:

   http://support.intel.com/support/motherboards/desktop/
2. Copy the BIOS upgrade file to a temporary directory on your hard disk.
3. Change to the temporary directory.
4. To extract the files, double click on the BIOS upgrade file, for example, CACBIOSxx.EXE.
5. One of the extracted files is MK_BOOTZ.EXE. Double click on this file to extract the README.TXT file.
6. Follow the directions in the README.TXT file.

Create the BIOS Upgrade Diskette

1. Obtain the BIOS upgrade file through your computer supplier or from the Intel World Wide Web site:

   http://support.intel.com/support/motherboards/desktop/
2. Copy the BIOS upgrade file to a temporary directory on your hard disk.
3. From the C:\ prompt, change to the temporary directory.
4. To extract the file, type the name of the BIOS upgrade file, for example, CABIOSxx.EXE.
5. Press <Enter>. The extracted file contains the following files:

   LICENSE.TXT
   BIOINSTR.TXT
   BIOS.EXE
   MK_BOOTZ.EXE
6. Read the LICENSE.TXT file, which contains the software license agreement, and the BIOINSTR.TXT file, which contains the instructions for the BIOS upgrade.
7. Insert the bootable diskette into drive A.
8. To extract the BIOS.EXE file to the diskette, change to the temporary directory that holds the BIOS.EXE file and type:

   ```
   BIOS A:
   ```
9. Press <Enter>.
10. The diskette now holds the new BIOS files, the Intel Flash Update Utility, and the recovery files.

Upgrading the BIOS

⚠ CAUTION

The AUTOEXEC.BAT file provided with the update files updates the BIOS in two parts: first updating the boot block and displaying the "Operation completed successfully" message and then updating the BIOS core. You will be asked to reboot the system when the update process is complete. Do not interrupt the process or the system may not be capable of rebooting.

1. Boot the computer with the BIOS upgrade diskette in drive A. During system boot, the AUTOEXEC.BAT file provided with the update files will automatically run the BIOS update process.
2. The AUTOEXEC.BAT file updates the BIOS in two parts: first updating the boot block and displaying the "Operation completed successfully" message and then updating the BIOS core.
3. When the update process is complete, the monitor will display a message telling you to remove the diskette and to reboot the system.
4. As the computer boots, check the BIOS identifier (version number) to make sure the upgrade was successful. If a logo appears, press <Esc> to view the POST messages.
5. To enter the BIOS Setup program, press <F2> when you see the message:

   ```
   Press <F2> to Run SETUP
   ```
6. For proper operation, load the BIOS Setup program defaults. To load the defaults, press <F9>.
7. To accept the defaults, press <Enter>.
8. In Setup, enter the settings you wrote down before beginning the BIOS upgrade.
9. To save the settings, press <F10>.
10. To accept the settings, press <Enter>.
11. Turn off the computer and reboot.

Recovering the BIOS

It is unlikely that anything will interrupt the BIOS upgrade; however, if an interruption occurs, the BIOS could be damaged. The following steps explain how to recover the BIOS if an upgrade fails. The following procedure uses recovery mode for the Setup program. See page 33 for more information on Setup modes.

NOTE

Because of the small amount of code available in the boot block area, there is no video support. You will not see anything on the screen during this procedure. Monitor the procedure by listening to the speaker and looking at the diskette drive LED.

1. Turn off the computer, disconnect the computer's power cord, and disconnect all external peripherals.
2. Remove the computer cover and locate the configuration jumper block (J7A1) (see Figure 14).
3. Remove the jumper from all pins as shown below to set recovery mode for Setup.

J7A1

4. Insert the bootable BIOS upgrade diskette into diskette drive A.
5. Replace the computer cover, connect the power cord, turn on the computer, and allow it to boot. The recovery process will take a few minutes.
6. Listen to the speaker.
   - Two beeps and the end of activity in drive A indicate successful BIOS recovery.
   - A series of continuous beeps indicates failed BIOS recovery.
7. If recovery fails, return to step 1 and repeat the recovery process.
8. If recovery is successful, turn off the computer, and disconnect its power cord.
9. Remove the computer cover and continue with the following steps.
10. On the jumper block (J7A1), reinstall the jumper back on pins 1-2 as shown below to set normal mode for Setup.

J7A1

11. Leave the upgrade diskette in drive A, replace the computer cover, and connect the computer's power cord.
12. Turn on the computer and continue with the BIOS upgrade (see page 37).

4 Using the Setup Program

The BIOS Setup program is for viewing and changing the BIOS settings for a computer. The BIOS Setup program is accessed by pressing the <F2> key after the Power-On Self-Test (POST) memory test begins and before the operating system boot begins. This chapter describes the contents of the BIOS Setup Program's screens.

NOTES

The Setup screens described in this section apply to desktop boards with BIOS identifier CA81020A.86A. Desktop boards with other BIOS identifiers might have differences in some of the Setup screens.

For reference purposes, you should write down the current Setup settings. When you make changes to the settings, update this record.

Table 5 shows the menus available from the menu bar at the top of the BIOS Setup program screen.

Table 5. BIOS Setup Program Menu Bar

BIOS Setup Program Menu Screen	Description
Maintenance	Used for clearing the BIOS Setup program passwords and provides access to extended configuration options. This menu is only available in configure mode.
Main	Displays system configuration information and allows user to reset the time and date.
Advanced	Specifies advanced features available through the chipset.
Security	Specifies passwords and security features.
Power	Specifies power management features.
Boot	Specifies boot options and power supply controls.
Exit	Saves or discards changes to the BIOS Setup program options.

Maintenance Menu

This menu is for clearing the Setup passwords and the Boot Integrity Service credentials, and for changing extended configuration memory settings. Setup only displays this menu in configure mode. See page 33 for information about setting configure mode.

Table 6. Maintenance Menu

Feature	Options	Description
Clear All Passwords	No options	Clears the user and supervisor passwords.
Clear BIS Credentials	No options	Clears the Wired for Management Boot Integrity Service (BIS) credentials.
Extended Configuration	No options	Allows user to manually configure advanced memory settings.
Processor Microcode Update Revision	No options	Displays the revision number of the processor microcode.
Processor Stepping Signature	No Options	Displays the processor stepping signature.

Extended Configuration Menu

This menu allows the user to configure memory settings that require detailed technical information.

⚠ CAUTION

Choosing the wrong settings could cause system problems. Do not change these settings unless you have all the necessary information about the installed memory.

Table 7. Extended Configuration Menu

Feature	Options	Description
Extended Configuration	• **Default (default)** • User Defined	Enables access to the extended memory configuration options.
SDRAM Auto-Configuration	• **Auto (default)** • User Defined	Sets extended memory configuration options to auto or user defined.
SDRAM CAS# Latency	• 3 • 2 • **Auto (default)**	Selects the number of clock cycles required to address a column in memory.
SDRAM RAS# to CAS# Delay	• 3 • 2 • **Auto (default)**	Selects the number of clock cycles between addressing a row and addressing a column.
SDRAM RAS# Precharge	• 3 • 2 • **Auto (default)**	Selects the length of time required before accessing a new row.

Main Menu

This menu reports processor and memory information and is for configuring the system date and time.

Table 8. Main Menu

Feature	Options	Description
BIOS Version	No options	Displays the version of the BIOS.
Processor Type	No options	Displays processor type.
Processor Speed	No options	Displays processor speed.
Cache RAM	No options	Displays the size of second-level cache.
Total Memory	No options	Displays the total amount of RAM on the desktop board.
Memory Bank 0 Memory Bank 1	No options	Displays size and type of DIMM installed in each memory bank.
System Time	Hour, minute, and second	Displays and allows system time to be set.
System Date	Month, day, and year	Displays and allows system date to be set.

Advanced Menu

This menu is for setting advanced features that are available through the chipset.

Table 9. Advanced Menu

Feature	Options	Description
Extended Configuration	No options	Indicates whether extended configuration settings have been modified from the default setting.
PCI Configuration	No options	Allows access to PCI IRQ mapping.
Boot Configuration	No options	Configures Plug and Play and the Numlock key, and resets configuration data. When selected, displays the Boot Settings Configuration submenu.
Peripheral Configuration	No options	Configures peripheral ports and devices. When selected, displays the Peripheral Configuration submenu.
IDE Configuration	No options	Specifies type of connected IDE device.
Diskette Configuration	No options	When selected, displays the Floppy Options submenu.
Event Log Configuration	No options	Configures Event Logging. When selected, displays the Event Log Configuration submenu.
Video Configuration	No options	Configures video features. When selected, displays the Video Configuration submenu.

PCI Configuration Submenu

This menu is for accessing PCI IRQ mapping.

Table 10. PCI Configuration Submenu

Feature	Options	Description
PCI Slot 1 IRQ Priority	• **Auto (default)** • 9 • 10 • 11	Allows the user to map the PCI IRQ for slot 1 to a particular hardware interrupt.
PCI Slot 2 IRQ Priority	• **Auto (default)** • 9 • 10 • 11	Allows the user to map the PCI IRQ for slot 2 to a particular hardware interrupt.
PCI Slot 3 IRQ Priority	• **Auto (default)** • 9 • 10 • 11	Allows the user to map the PCI IRQ for slot 3 to a particular hardware interrupt.
PCI Slot 4 IRQ Priority	• **Auto (default)** • 9 • 10 • 11	Allows the user to map the PCI IRQ for slot 4 to a particular hardware interrupt.

Boot Configuration Submenu

This menu is for setting Plug and Play and the Numlock key, and for resetting configuration data.

Table 11. Boot Configuration Submenu

Feature	Options	Description
Plug & Play O/S	• **No (default)** • Yes	Specifies if manual configuration is desired. *No* lets the BIOS configure all devices. This setting is appropriate when using a Plug and Play operating system. *Yes* lets the operating system configure Plug and Play devices. This option is available for use during lab testing.
Reset Config Data	• **No (default)** • Yes	Clears the BIOS configuration data on the next boot.
Numlock	• Off • **On (default)**	Specifies the power on state of the Numlock feature on the numeric keypad of the keyboard.

Peripheral Configuration Submenu

This submenu is used for configuring the computer peripherals.

Table 12. Peripheral Configuration Submenu

Feature	Options	Description
Serial port A	• Disabled • Enabled • **Auto (default)**	Configures serial port A. *Auto* assigns the first free COM port, normally COM1, the address 3F8h, and the interrupt IRQ4. An * (asterisk) displayed next to an address indicates a conflict with another device.
Base I/O address	• **3F8 (default)** • 2F8 • 3E8 • 2E8	Specifies the base I/O address for serial port A, if Serial Port A is set to Enabled.
Interrupt	• IRQ 3 • **IRQ 4 (default)**	Specifies the interrupt for serial port A, if Serial Port A is set to Enabled.
Serial port B	• Disabled • Enabled • **Auto (default)**	Configures serial port B. *Auto* assigns the first free COM port, normally COM2, the address 2F8h and the interrupt IRQ3. An * (asterisk) displayed next to an address indicates a conflict with another device. If either serial port address is set, that address will not appear in the list of options for the other serial port.
Mode	• **Normal (default)** • IrDA SIR-A • ASK_IR	Specifies the mode for serial port B for normal (COM2) or infrared applications. This option is not available if serial port B has been disabled.

continued

Table 12. Peripheral Configuration Submenu (continued)

Feature	Options	Description
Base I/O address	• **2F8 (default)** • 3E8 • 2E8	Specifies the base I/O address for serial port B.
Interrupt	• **IRQ 3 (default)** • IRQ 4	Specifies the interrupt for serial port B.
Parallel port	• Disabled • Enabled • **Auto (default)**	Configures the parallel port. *Auto* assigns LPT1 the address 378h and the interrupt IRQ7. An * (asterisk) displayed next to an address indicates a conflict with another device.
Mode	• Output Only • **Bi-directional (default)** • EPP • ECP	Selects the mode for the parallel port. Not available if the parallel port is disabled. *Output Only* operates in AT†-compatible mode. *Bi-directional* operates in PS/2-compatible mode. *EPP* is Extended Parallel Port mode, a high-speed bi-directional mode. *ECP* is Enhanced Capabilities Port mode, a high-speed bi-directional mode.
Base I/O address	• **378 (default)** • 278 • 228	Specifies the base I/O address for the parallel port.
Interrupt	• IRQ 5 • **IRQ 7 (default)**	Specifies the interrupt for the parallel port.
Audio Device	• Disabled • **Enabled (default)**	Enables or disables the onboard audio subsystem.
LAN Device	• Disabled • **Enabled (default)**	Enables or disables the optional onboard 10/100 Ethernet.
Legacy USB Support	• Disabled • Enabled • **Auto (default)**	Enables or disables USB legacy support.

IDE Configuration

Table 13. IDE Device Configuration

Feature	Options	Description
IDE Controller	• Disabled • Primary • Secondary • **Both (default)**	Specifies the integrated IDE controller. *Primary* enables only the Primary IDE Controller. *Secondary* enables only the Secondary IDE Controller. *Both* enables both IDE controllers.
Hard Disk Pre-Delay	• **Disabled (default)** • 3 Seconds • 6 Seconds • 9 Seconds • 12 Seconds • 15 Seconds • 21 Seconds • 30 Seconds	Specifies the hard disk drive pre-delay.
Primary IDE Master	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Master submenu.
Primary IDE Slave	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Slave submenu.
Secondary IDE Master	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Master submenu.
Secondary IDE Slave	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Slave submenu.

IDE Configuration Submenus

This submenu is for configuring IDE devices, including:

- Primary IDE master
- Primary IDE slave
- Secondary IDE master
- Secondary IDE slave

Table 14. IDE Configuration Submenus

Feature	Options	Description
Type	• None • User • **Auto (default)** • CD-ROM • ATAPI Removable • Other ATAPI • IDE Removable	Specifies the IDE configuration mode for IDE devices. *User* allows the user to change the LBA Mode Control, Multi-Sector Transfers, PIO Mode, and Ultra DMA settings. *Auto* automatically sets the LBA Mode Control, Multi-Sector Transfers, PIO Mode, and Ultra DMA settings.
LBA Mode Control	• Disabled • **Enabled (default)**	Enables or disables the LBA mode control.
Multi-Sector Transfers	• Disabled • 2 Sectors • 4 Sectors • 8 Sectors • **16 Sectors (default)**	Specifies number of sectors per block for transfers from the hard disk drive to memory. Check the hard disk drive's specifications for optimum setting.
PIO Mode	• **Auto (default)** • 0 • 1 • 2 • 3 • 4	Specifies the method for moving data to/from the drive.
Ultra DMA	• **Disabled (default)** • Mode 0 • Mode 1 • Mode 2 • Mode 3 • Mode 4	Specifies the Ultra DMA mode for the drive.

Diskette Configuration Submenu

This submenu is for configuring the diskette drive.

Table 15. Diskette Configurations Submenu

Feature	Options	Description
Diskette Controller	• Disabled • **Enabled (default)**	Disables or enables the integrated diskette controller.
Floppy A:	• Not Installed • 360 KB, 5¼″ • 1.2 MB, 5¼″ • 720 KB, 3½″ • **1.44/1.25 MB, 3½″ (default)** • 2.88 MB, 3½″	Specifies the capacity and physical size of diskette drive A.
Diskette Write Protect	• **Disabled (default)** • Enabled	Disables or enables write protect for the diskette drive.

Event Log Configuration Submenu

This submenu is for configuring the event logging features.

Table 16. Event Log Configuration Submenu

Feature	Options	Description
Event Log	No options	Indicates if there is space available in the event log.
Event Log Validity	No options	Indicates if the contents of the event log are valid.
View Event Log	No options	Displays the event log.
Clear All Event Logs	• **No (default)** • Yes	Clears the event log after rebooting.
Event Logging	• Disabled • **Enabled (default)**	Enables logging of events.
Mark Events As Read	No Options	Marks all events as read.

Video Configuration Submenu

This submenu is for configuring video features.

Table 17. Video Configuration Submenu

Feature	Options	Description
Primary Video Adapter	• **AGP (default)** • PCI	Allows the user to select between the onboard direct AGP graphics or the PCI add-in graphics card as primary graphics adapter in a multi-monitor system.

Security Menu

This menu is for setting passwords and security features.

Table 18. Security Menu

Feature	Options	Description
Supervisor Password Is	No options	Reports if there is a supervisor password set.
User Password Is	No options	Reports if there is a user password set.
Set Supervisor Password	Password can be up to seven alphanumeric characters.	Specifies the supervisor password.
Set User Password	Password can be up to seven alphanumeric characters.	Specifies the user password.
Clear User Password	No options	Clears the user password.
User Access Level	• Limited • No Access • View Only • **Full (default)**	Specifies the amount of user access to the Setup program. *Limited* allows only limited fields to be changed. *No Access* prevents user access. *View Only* allows the user to view but not change the fields in the Setup program. *Full* allows any field to be changed except the supervisor password.
Unattended Start	• **Disabled (default)** • Enabled	Disables or enables an unattended start.

Power Menu

This menu is for setting power management features.

Table 19. Power Menu

Feature	Options	Description
Power Management	• Disabled • **Enabled (default)**	Enables or disables the APM BIOS power management feature.
Inactivity Timer	• Off • 1 Minute • 5 Minutes • 10 Minutes • **20 Minutes (default)** • 30 Minutes • 60 Minutes • 120 Minutes	Specifies the amount of time before the computer enters standby mode, when APM power management is active.
Hard Drive	• Disabled • **Enabled (default)**	Enables or disables power management for hard disks during standby and suspend modes, when APM power management is active.
Video Power Down	• Disabled • Standby • **Suspend (default)** • Sleep	Specifies power management for video during standby and suspend modes, when APM power management is active.
ACPI Suspend State	• **S1 State (default**) • S3 State	Selects the suspend state the system will use when ACPI power management is active. To enable an instantly available configuration, this must be set to the S3 state and an operating system which fully supports the ACPI S3 suspend state must be installed.

Boot Menu

This menu is for setting the boot features and the boot sequence.

Table 20. Boot Menu

Feature	Options	Description
Quiet Boot	• Disabled • **Enabled (default)**	*Disabled* displays normal POST messages. *Enabled* displays the OEM logo instead of POST messages.
Quick Boot	• Disabled • **Enabled (default)**	Enables the computer to boot without running certain POST tests.
Scan User Flash Area	• **Disabled (default)** • Enabled	Enables the BIOS to scan the flash memory for user binary files that are executed at boot time.
After Power Failure	• Stays Off • **Last State (default)** • Power On	Specifies the mode of operation if an AC/Power loss occurs. *Power On* restores power to the computer. *Stay Off* keeps the power off until the power button is pressed. *Last State* restores the previous power state before power loss occurred.
On Modem Ring	• **Stay Off (default)** • Power On	Specifies how the computer responds to an incoming call on an installed modem when the power is off.
On LAN	• Stay Off • **Power On (default)**	Specifies how the computer responds to a LAN wakeup event when the power is off.
On PME	• **Stay Off (default)** • Power On	Specifies how the computer responds to a PME wakeup event when the power is off.

continued

Table 20. Boot Menu (continued)

Feature	Options	Description
First Boot Device Second Boot Device Third Boot Device Fourth Boot Device Fifth Boot Device Sixth Boot Device Seventh Boot Device Eighth Boot Device	• Floppy • ARMD-FDD (Note 1) • ARMD-HDD (Note 2) • IDE-HDD • ATAPI CD-ROM • Intel UNDI, PXE 2.0 (build 071) (Note 3) • Disabled	Specifies the boot sequence from the available devices. To specify the boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <Enter> to set the selection as the intended boot device. The operating system assigns a drive letter to each boot device in the order listed. Changing the order of the devices changes the drive lettering. The default settings for the first through eighth boot devices are, respectively: • Floppy • IDE-HDD • ATAPI CD-ROM • Intel UNDI, PXE 2.0 (build 071) • Disabled • Disabled • Disabled • Disabled
IDE Drive Configuration: Primary Master IDE Primary Slave IDE Secondary Master IDE Secondary Slave IDE	• 1st IDE • 2nd IDE • 3rd IDE • 4th IDE	Specifies the boot sequence of the IDE devices when, in the preceding feature, boot devices are set to IDE-HDD. If the system is unsuccessful at booting from the first IDE device, the BIOS will return to the preceding feature to determine which device to attempt booting from next. The system will attempt to boot from the second IDE device only if, in the preceding feature, another boot device is set to IDE-HDD. To specify the IDE boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <Enter> to set the selection as the intended boot device. The default settings for the first through fourth IDE devices are, respectively: Primary Master IDE Primary Slave IDE Secondary Master IDE Secondary Slave IDE

Notes:

1. ARMD-FDD = ATAPI removable device - floppy disk drive
2. ARMD-HDD = ATAPI removable device - hard disk drive
3. UNDI = Universal Network Interface Card (NIC) Driver Interface
   PXE = Pre-boot eXecution Environment

Exit Menu

This menu is for exiting the BIOS Setup program, saving changes, and loading and saving defaults.

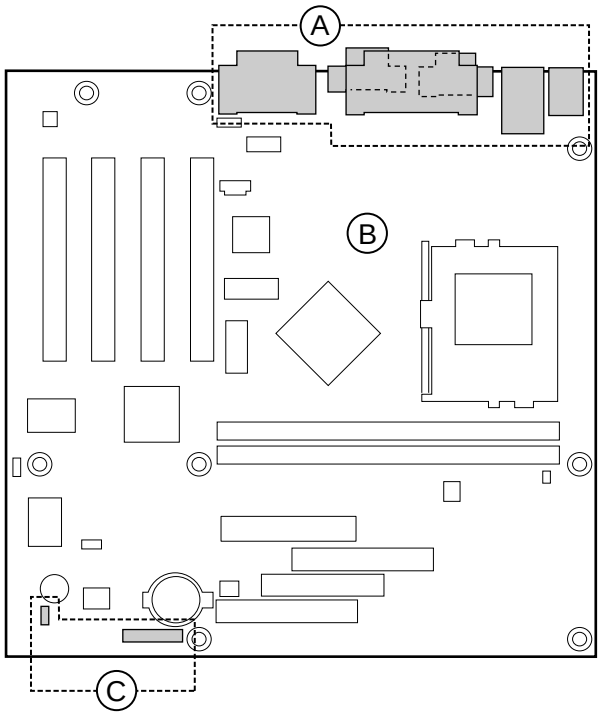
Table 21. Exit Menu

Feature	Description
Exit Saving Changes	Exits and saves the changes in CMOS SRAM.
Exit Discarding Changes	Exits without saving any changes made in the Setup program.
Load Setup Defaults	Loads the factory default values for all the Setup options.
Load Custom Defaults	Loads the custom defaults for Setup options.
Save Custom Defaults	Saves the current values as custom defaults. Normally, the BIOS reads the Setup values from flash memory. If this memory is corrupted, the BIOS reads the custom defaults. If no custom defaults are set, the BIOS reads the factory defaults.
Discard Changes	Discards changes without exiting the Setup program. The option values present when the computer was turned on are used.

5 Technical Reference

Desktop Board Connectors

The desktop board's connectors can be divided into three groups, as shown in Figure 15.



A Back panel connectors (see page 54)

B Midboard connectors (see page 55)

C Front panel connectors (see page 56)

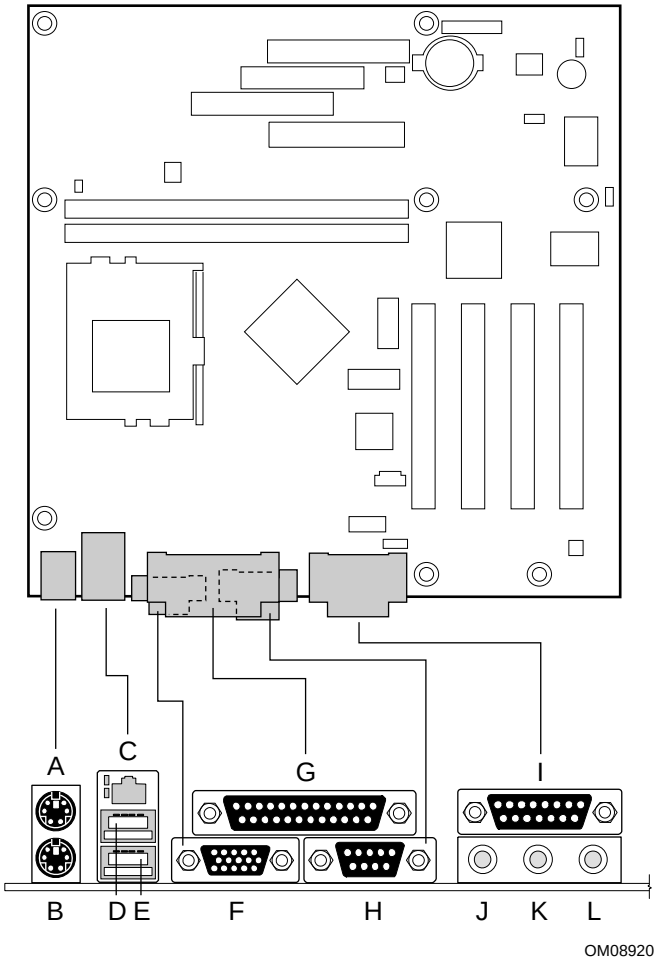
Figure 15. Connector Groups

CAUTION

Many of the midboard and front panel connectors provide operating voltage (+5 V DC and +12 V DC, for example) to devices inside the computer chassis, such as fans and internal peripherals. These connectors are not overcurrent protected. Do not use these connectors for powering devices external to the computer chassis. A fault in the load presented by the external devices could cause damage to the computer, the interconnecting cable, and the external devices themselves.

Back Panel Connectors

Figure 16 shows the back panel connectors on the desktop board.



A	PS/2 keyboard or mouse	G	Parallel port
B	PS/2 keyboard or mouse	H	Serial port A
C	RJ-45 LAN connector with indicator LEDs (optional)	I	MIDI/Game port
D	USB port 0	J	Audio line out
E	USB port 1	K	Audio line in
F	VGA port	L	Mic in

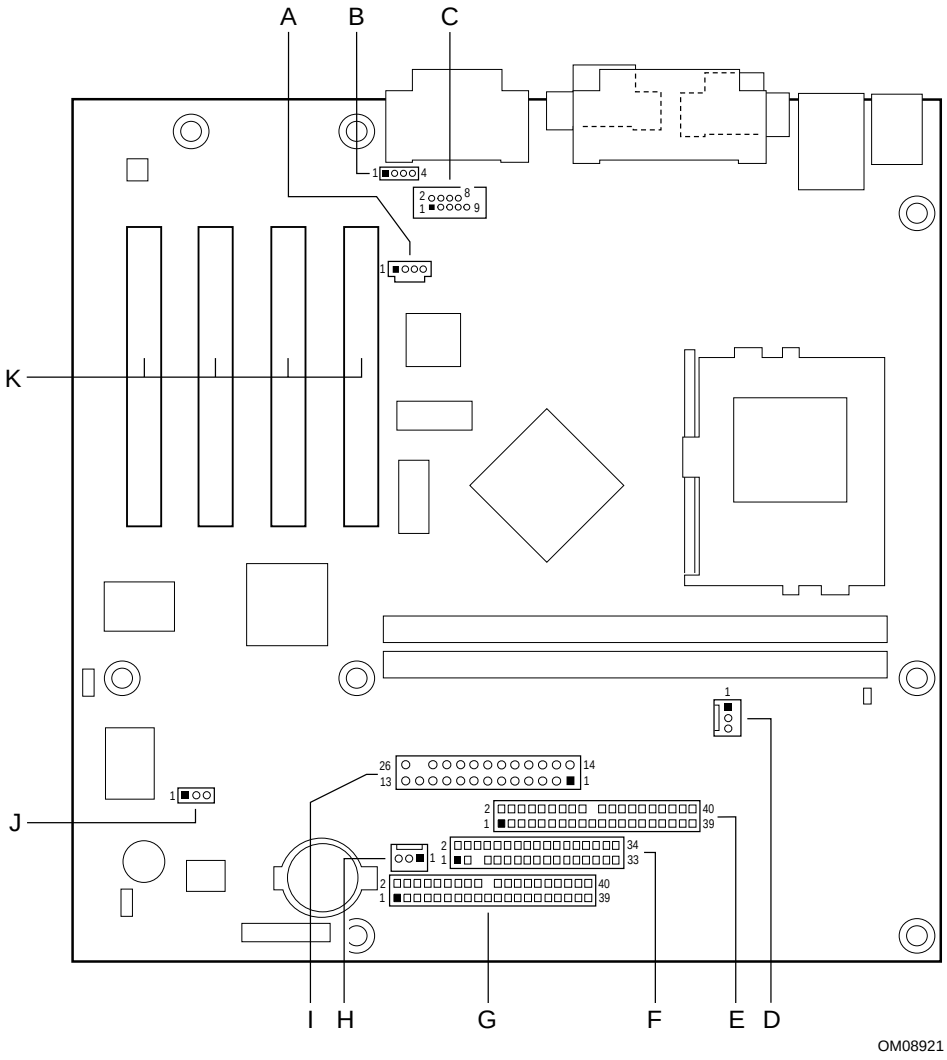
Figure 16. Back Panel Connectors and Indicators

NOTE

The line out connector, located on the back panel, is designed to power headphones or amplified speakers only. Poor audio quality may occur if passive (non-amplified) speakers are connected to this output.

Midboard Connectors

Figure 17 shows the location of the midboard connectors.

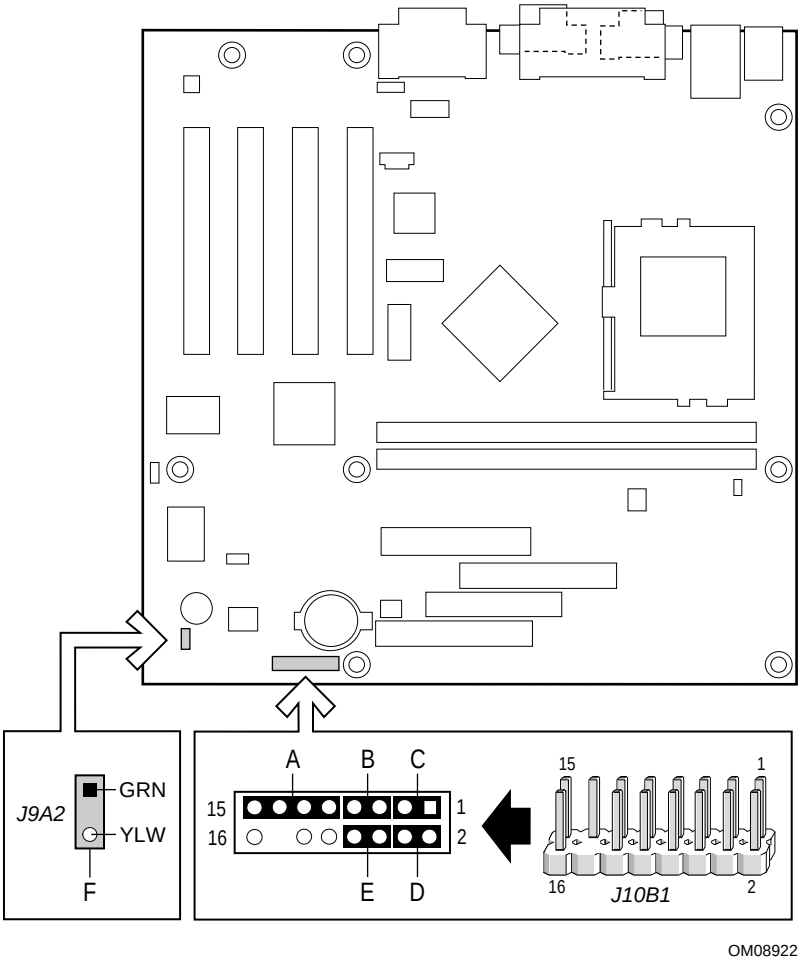


A ATAPI-style CD-ROM
B Legacy CD-ROM
C Serial port B
D Processor fan
E Secondary IDE
F Diskette drive
G Primary IDE
H Chassis fan
I Power supply
J Wake on LAN technology (optional)
K PCI slots

Figure 17. Midboard Connectors

Front Panel Connectors

Figure 18 shows the location of the front panel connectors.



A Infrared port
B Reset switch
C Hard drive activity LED
D Power LED
E On/Off switch
F Alternate 1x3 front panel power LED

Figure 18. Front Panel Connectors

Desktop Board Resources

Memory Map

Table 22. System Memory Map

Address Range (decimal)	Address Range (hex)	Size	Description
1024 K - 524288 K	100000 - 1FFFFFFF	511 MB	Extended memory
960 K - 1024 K	F0000 - FFFFF	64 KB	Runtime BIOS
896 K - 960 K	E0000 - EFFFF	64 KB	Reserved
800 K - 896 K	C8000 - DFFFF	96 KB	Available high DOS memory (open to PCI bus)
640 K - 800 K	A0000 - C7FFF	160 KB	Video memory and BIOS
639 K - 640 K	9FC00 - 9FFFF	1 KB	Extended BIOS data (movable by memory manager software)
512 K - 639 K	80000 - 9FBFF	127 KB	Extended conventional memory
0 K - 512 K	00000 - 7FFFF	512 KB	Conventional memory

DMA Channels

Table 23. DMA Channels

DMA Channel Number	Data Width	System Resource
0	8- or 16-bits	Audio
1	8- or 16-bits	Audio / parallel port
2	8- or 16-bits	Diskette drive
3	8- or 16-bits	Parallel port (for ECP or EPP) / audio
4		DMA controller
5	16-bits	Open
6	16-bits	Open
7	16-bits	Open

I/O Map

Table 24. I/O Map

Address (hex)	Size	Description
0000 - 000F	16 bytes	DMA controller
0020 - 0021	2 bytes	Programmable Interrupt Control (PIC)
0040 - 0043	4 bytes	System timer
0060	1 byte	Keyboard controller byte—reset IRQ
0061	1 byte	System speaker
0064	1 byte	Keyboard controller, CMD/STAT byte
0070 - 0071	2 bytes	System CMOS / Real Time Clock
0072 - 0073	2 bytes	CMOS Bank 1
0080 - 0090		DMA controller
0094 - 009F		DMA controller
00A0 - 00A1	2 bytes	PIC
00B2 - 00B3	2 bytes	APM control
00C0 - 00DE	31 bytes	DMA
00F0 - 00FF		Numeric data processor
0170 - 0177	8 bytes	Secondary IDE channel
01F0 - 01F7	8 bytes	Primary IDE channel
One of these ranges: 0200 - 0207 0208 - 020F 0210 - 0217 0218 - 021F	Can vary from 1 byte to 8 bytes	Audio / game port
0220 - 022F	16 bytes	Audio (Sound Blaster Pro† -compatible)
0240 - 024F	16 bytes	Audio (Sound Blaster Pro-compatible)
0240 - 024F	16 bytes	Audio (Sound Blaster-compatible)
0278 - 027F*	8 bytes	LPT2
0228 - 022F*	8 bytes	LPT3
02E8 - 02EF*	8 bytes	COM4/video (8514A)
02F8 - 02FF*	8 bytes	COM2
One of these ranges: 0320 - 0327 0330 - 0337 0340 - 0347 0350 - 0357	8 bytes	MPU-401 (MIDI)
0376	1 byte	Secondary IDE channel command port

continued

Table 24. I/O Map (continued)

Address (hex)	Size	Description
0377, bits 6:0	7 bits	Secondary IDE channel status port
0378 - 037F	8 bytes	LPT 1
0388- 038B	4 bytes	AdLib† (FM synthesizer)
03B0 - 03BB	11 bytes	Intel 82810E DC133 GMCH
03C0 – 03DF	32 bytes	Intel 82810E DC133 GMCH
03CC	1 byte	Video (VGA)
03CE - 03CF	2 bytes	Video (VGA)
03D4 - 03D5	2 bytes	Video (VGA)
03DA	1 byte	Video (VGA)
03E8 - 03EF	8 bytes	COM3
03F0 - 03F5	6 bytes	Diskette channel 1
03F6	1 byte	Primary IDE channel command port
03F8 - 03FF	8 bytes	COM1
One of these ranges: 0530 - 0537 0E80 - 0E87 0F40 - 0F47	8 bytes	Windows Sound System
0800 - 087F		Desktop board resources
9000 - 9FFF		Intel 82810AA PCI bridge
LPTn + 400	8 bytes	ECP port, LPTn base address + 400
0CF8 - 0CFB*	4 bytes	PCI configuration address register
0CF9**	1 byte	Turbo and reset control register
0CFC - 0CFF	4 bytes	PCI configuration data register
EF00 - EF3F	64 bytes	Windows Sound System
FFA0 - FFA7	8 bytes	Primary bus master IDE registers
FFA8 - FFAF	8 bytes	Secondary bus master IDE registers
32 contiguous bytes starting on a 32-byte divisible boundary		Intel 82559 LAN controller
64 contiguous bytes starting on a 64-byte divisible boundary		Onboard audio controller

* Dword access only

** Byte access only

Interrupts

Table 25. Interrupts

IRQ	System Resource
NMI	I/O channel check
0	Reserved, interval timer
1	Reserved, keyboard buffer full
2	Reserved, cascade interrupt from slave PIC
3	COM2* (user available if COM2 is not present)
4	COM1*
5	LPT2 (Plug and Play option)/audio/user available
6	Diskette drive controller
7	LPT1*
8	Real time clock
9	User available
10	User available
11	User available
12	Onboard mouse port (if present, else user available)
13	Reserved, math coprocessor
14	Primary IDE (if present, else user available)
15	Secondary IDE (if present, else user available)

* Default, but can be changed to another IRQ.

A Error Messages

BIOS Beep Codes

Whenever a recoverable error occurs during the POST, the BIOS displays an error message describing the problem. The BIOS also issues a beep code (one long tone followed by two short tones) during POST if the video configuration fails (a faulty video card or no card installed) or if an external ROM module does not properly checksum to zero.

Table 26. Beep Codes

Number of Beeps	Description
1	Refresh failure
2	Parity can not be reset
3	First 64 K memory failure
4	Timer not operational
5	Processor failure (Reserved; not used)
6	8042 GateA20 cannot be toggled (memory failure or not present)
7	Exception interrupt error
8	Display memory R/W error
9	ROM checksum error (Reserved; not used)
10	CMOS Shutdown register test error
11	Invalid BIOS (such as, POST module not found)

BIOS Error Messages

Table 27. BIOS Error Messages

Error Message	Explanation
GA20 Error	An error occurred with Gate A20 when switching to protected mode during the memory test.
Pri Master HDD Error Pri Slave HDD Error Sec Master HDD Error Sec Slave HDD Error	Could not read sector from corresponding drive.
Pri Master Drive - ATAPI Incompatible Pri Slave Drive - ATAPI Incompatible Sec Master Drive - ATAPI Incompatible Sec Slave Drive - ATAPI Incompatible	Corresponding drive is not an ATAPI device. Run Setup to make sure device is selected correctly.
A: Drive Error	No response from diskette drive.

continued

Table 27. BIOS Error Messages (continued)

Error Message	Explanation
CMOS Battery Low	The battery may be losing power. Replace the battery soon.
CMOS Display Type Wrong	The display type is different than what has been stored in CMOS. Check Setup to make sure type is correct.
CMOS Checksum Bad	The CMOS checksum is incorrect. CMOS memory may have been corrupted. Run Setup to reset values.
CMOS Settings Wrong	CMOS values are not the same as the last boot. These values have either been corrupted or the battery has failed.
CMOS Date/Time Not Set	The time and/or date values stored in CMOS are invalid. Run Setup to set correct values.
DMA Error	Error during read/write test of DMA controller.
FDC Failure	Error occurred trying to access diskette drive controller.
HDC Failure	Error occurred trying to access hard disk controller.
Checking NVRAM.....	NVRAM is being checked to see if it is valid.
Update OK!	NVRAM was invalid and has been updated.
Updated Failed	NVRAM was invalid but was unable to be updated.
Keyboard Is Locked	The system keyboard lock is engaged. The system must be unlocked to continue to boot.
Keyboard Error	Error in the keyboard connection. Make sure keyboard is connected properly.
KB/Interface Error	Keyboard interface test failed.
Memory Size Decreased	Memory size has decreased since the last boot. If no memory was removed, then memory may be bad.
Memory Size Increased	Memory size has increased since the last boot. If no memory was added, there may be a problem with the system.
Memory Size Changed	Memory size has changed since the last boot. If no memory was added or removed, then memory may be bad.
No Boot Device Available	System did not find a device to boot.
Off Board Parity Error	A parity error occurred on an offboard card. This error is followed by an address.
On Board Parity Error	A parity error occurred in onboard memory. This error is followed by an address.
Parity Error	A parity error occurred in onboard memory at an unknown address.
NVRAM / CMOS / PASSWORD cleared by Jumper	NVRAM, CMOS, and passwords have been cleared. The system should be powered down and the jumper removed.
<CTRL_N> Pressed	CMOS is ignored and NVRAM is cleared. User must enter Setup.

B Regulatory and Integration Information

This appendix contains:

- Safety standards, electromagnetic compatibility regulations, and product certification markings for this desktop board
- Instructions and precautions for integrators who are installing this desktop board in a chassis

Regulatory Compliance

This desktop board complies with the following safety and EMC regulations when correctly installed in a compatible chassis.

Table 28. Safety Regulations

Regulation	Title
UL 1950/CSA950, 3rd edition, Dated 07-28-95	Bi-National Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (USA and Canada)
EN 60950, 2nd Edition, 1992 (with Amendments 1, 2, 3, and 4)	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (European Community)
IEC 950, 2nd edition, 1991 (with Amendments 1, 2, 3, and 4)	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (International)
EMKO-TSE (74-SEC) 207/94	Summary of Nordic changes to EN 60950. (Norway, Sweden, Denmark, and Finland)

Table 29. EMC Regulations

Regulation	Title
FCC Class B	Title 47 of the Code of Federal Regulations, Parts 2 and 15, Subpart B, pertaining to unintentional radiators. (USA)
CISPR 22, 2nd Edition, 1993 (Class B)	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (International)
VCCI Class B (ITE)	Implementation Regulations for Voluntary Control of Radio Interference by Data Processing Equipment and Electronic Office Machines. (Japan)
EN55022 (1994) (Class B)	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (Europe)
EN50082-1 (1992)	Generic Immunity Standard; Currently compliance is determined via testing to IEC 801-2, -3, and –4. (Europe)
ICES-003 (1997)	Interference-Causing Equipment Standard, Digital Apparatus, Class B (Including CRC c.1374). (Canada)
AS/NZ 3548	Australian Communications Authority (ACA), Standard for Electromagnetic Compatibility.

Product Certification Markings

This printed circuit assembly has the following product certification markings:

- UL Joint Recognition mark: Consists of small c followed by a stylized backward UR and followed by a small US (Component side)
- Manufacturer's recognition mark: Consists of a unique UL recognized manufacturer's logo, along with a flammability rating (94V-0) (Solder side)
- UL file number for desktop boards: E139761 (Component side)
- PB part number: Intel bare circuit board part number A01601-002 (Solder side)
- Battery "+ Side Up" marking: Located on the component side of the board in close proximity to the battery holder
- FCC logo/declaration: Located on the solder side
- ACA (C-Tick) mark: Consists of a unique letter C, with a tick mark; followed by N-232. Located on the component side of the desktop board and on the shipping container.
- CE mark: Located on the component side and on the shipping container

Installation Precautions

When you install and test the desktop board, observe all warnings and cautions in the installation instructions.

To avoid injury, be careful of:

- Sharp pins on connectors
- Sharp pins on printed circuit assemblies
- Rough edges and sharp corners on the chassis
- Hot components (like processors, voltage regulators, and heat sinks)
- Damage to wires that could cause a short circuit

Observe all warnings and cautions that instruct you to refer computer servicing to qualified technical personnel.

WARNING

Do not open the power supply. Risk of electric shock and burns from high voltage and rapid overheating. Refer servicing of the power supply to qualified technical personnel.

Installation Instructions

CAUTION

Follow these guidelines to meet safety and regulatory requirements when installing this board assembly.

Read and adhere to all of these instructions and the instructions supplied with the chassis and associated modules. If the instructions for the chassis are inconsistent with these instructions or the instructions for associated modules, contact the supplier's technical support to find out how you can ensure that your computer meets safety and regulatory requirements. If you do not follow these instructions and the instructions provided by chassis and module suppliers, you increase safety risk and the possibility of noncompliance with regional laws and regulations.

Ensure Electromagnetic Compatibility (EMC)

Before computer integration, make sure that the power supply and other modules have passed EMC testing using a desktop board with a processor from the same family and operating at the same (or higher) speed as the processor on this desktop board.

In the installation instructions for the host chassis, power supply, and other modules pay close attention to the following:

- Certifications
- External I/O cable shielding and filtering
- Mounting, grounding, and bonding requirements
- Keying connectors when mismating of connectors could be hazardous

If the power supply and other modules have not passed applicable EMC testing before integration, EMC testing must be conducted on a representative sample of the newly completed computer.

Ensure Chassis and Accessory Module Certifications

Make sure that the chassis, any added subassembly, such as a board or drive assembly, and internal or external wiring, are certified for the region(s) where the end-product will be used. Marks on the product are proof of certification. Certification marks are as follows:

In Europe

The CE marking signifies compliance with all relevant European requirements. If the chassis does not bear the CE marking, obtain a supplier's Declaration of Conformity to the appropriate standards required by the European EMC Directive and Low Voltage Directive. Other directives, such as the Machinery and Telecommunications Directives, might also apply depending on the type of product. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate overcurrent protection. Appropriate protection is provided by a maximum 8-A current limiting circuit or a maximum 5-A fuse or positive temperature coefficient (PTC) resistor. All Intel desktop boards now have PTCs on all external ports that provide DC power externally.

In the United States

A certification mark by a Nationally Recognized Testing Laboratory (NRTL) such as UL, CSA, or ETL signifies compliance with safety requirements. External wiring must be UL Listed and suitable for the intended use. Internal wiring must be UL Listed or Recognized and rated for applicable voltages and temperatures. The FCC mark (Class A for commercial or industrial only or Class B for residential) signifies compliance with electromagnetic interference requirements.

In Canada

A nationally recognized certification mark such as CSA or cUL signifies compliance with safety requirements. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate overcurrent protection. Appropriate protection is provided by a maximum 8-A current limiting circuit or a maximum 5-A fuse or positive temperature coefficient (PTC) resistor. All Intel desktop boards now have PTCs on all external ports that provide DC power externally.

Prevent Power Supply Overload

Unless the power supply has inherent overcurrent protection, do not overload the power supply output. To avoid overloading the power supply, make sure that the calculated total current load of all the modules within the computer is less than the output current rating of the power supply. If you do not do this, the power supply could overheat, catch fire, or damage the insulation that separates hazardous AC line circuitry from low-voltage user accessible circuitry. If the load drawn by a module cannot be determined by the markings and instructions supplied with the module, contact the module supplier's technical support.

Place Battery Marking on the Computer

There is insufficient space on this desktop board to provide instructions for replacing and disposing of the battery. The following warning must be placed permanently and legibly on the chassis as near as possible to the battery.

⚠ WARNINGS

Danger of explosion if battery is incorrectly replaced.

Replace with only the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Use Only for Intended Applications

This desktop board was evaluated for use in computers that will be installed in offices, homes, schools, computer rooms, and similar locations. The suitability of this product for other applications, (such as medical, industrial, alarm systems, and test equipment) might require further evaluation.